UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA

Hysitron Inc.,

Plaintiff,

vs.

MTS Systems Corp.,

Defendant.

MEMORANDUM OPINION AND ORDER
Civil No. 07-1533 ADM/AJB

Allen W. Hinderaker, Esq., Tong Wu, Esq., Joshua P. Graham, Esq., and Brian N. Platt, Esq., Merchant & Gould P.C., Minneapolis, MN, appeared for and on behalf of the Plaintiff.

David P. Pearson, Esq., Daniel J. Kelly, Esq., Brent A. Lorentz, Esq., and Karen A. Brennan, Esq., Winthrop & Weinstine, P.A., Minneapolis, MN, appeared for and on behalf of the Defendant.

I. INTRODUCTION

On February 9, 2009, a Markman hearing was held before the undersigned United States District Judge on the patent infringement claim of Plaintiff Hysitron Inc. ("Hysitron") against Defendant MTS Systems Corp. ("MTS"). Hysitron alleges that MTS infringed claims 1, 3, and 6 of U.S. Patent No. 5,553,486 ("the '486 patent") and claims 1-4, 7-9, and 11-15 of U.S. Patent No. 6,026,677 ("the '677 patent"). MTS counterclaims for a declaratory judgment of non-infringement and invalidity of both the '486 patent and the '677 patent.

II. BACKGROUND

The '486 patent and '677 patent, both entitled "Apparatus for Microindentation Hardness Testing and Surface Imaging Incorporating a Multi-Plate Capacitor System," each describe a device that incorporates a force, weight, or position sensor unit into an apparatus for

microindentation hardness testing and surface imaging, which allows immediate imaging of the surface subsequent to hardness testing. Graham Decl. [Docket No. 146] Ex. 1 ('486 patent), col. 3:60-65; Ex. 2 ('677 patent), col. 3:60-65.[1] The device combines three technologies: scanned probe microscopy, nanoindentation, and capacitive transduction. A scanned probe microscope ("SPM") generates atomic level topographical images of a specimen by scanning a probe in three dimensions over its surface. MTS's Markman Br. [Docket No. 148] at 4. A nanoindenter tests the mechanical properties, such as hardness or elasticity, of a specimen by forcing a probe into the specimen. Id. A capacitive transducer transforms a mechanical displacement into an electrical signal or vice versa. Id.

The development of SPMs, which allow examination of a surface at close range using a probe that may be a single atom across, has created a need for higher resolution measurement of force and position at minute levels. '486 patent, col. 1:48-55. Two common types of SPMs are the atomic force microscope and the scanning tunneling microscope. Id., cols. 1:61-2:5. In an atomic force microscope, a scanned-probe device moves a minute tip over a specimen in a raster pattern recording contours of force, which reads the surface of the specimen. Id., col. 1:61-65. A scanning tunneling microscope senses atomic-scale topography by means of electrons that tunnel across the gap between a probe and the surface. Id., col. 2:3-5. Piezoelectric ceramics[2] maneuver a tungsten probe in three directions and the tunneling current varies with the

[1] The language of both the '486 patent and the '677 patent preceding the recitation of claims is essentially the same. For this reason, all citations to the '486 patent in this section correspond to identical language in the '677 patent.

[2] Piezoelectric ceramics change size slightly in response to changes in applied voltage. '486 patent, col. 2:5-7.

topography. Id., col. 2:5-13. The movement of the probe's tip is then translated into an image of the surface of the specimen. Id., col. 2:14-15.

At the time of the patent application, strain gauge transducers were one industry recognized instrument used for purposes of micro hardness testing. Id., 1:32-33. Under the then known tips and control mechanisms for atomic force microscopes and scanning tunneling microscopes these SPMs were unable to both measure surface topography and conduct microindentation hardness tests. Id., col. 2:27-34. The value of microindentation hardness tests would derive from its ability to immediately image the results with high resolution capability. Id. Until recently, the industry had used indentation and scratch testing to study the mechanical properties of materials on a microscopic scale. Id., col. 2:53-55. Traditionally, the indentation or scratch was performed on one machine designed for that purpose and then transferred to a different device, such as an SPM, to image the surface. Id., cols. 2:64-3:2. The process of preparing a sample for a transfer from the indentation device to the SPM was intricate and time consuming. Id., col. 3:3-19. The process could also lead to uncertain results because an indent produced by a separate indenter may disappear within one hour due to plastic flow or relaxation. Id., col. 3:20-24. Other types of indentations had also proven to be undetectable by many SPMs. Id., 3:24-35. Accordingly, a device that could immediately create a high resolution image when making microindentation and scratch tests would reduce the time and costs of the measurements and reduce uncertainties about the results. Id., col. 3:36-42. The '486 and '677 patents were designed to be this device.

The '486 patent consists of claims 1 through 40. Id., cols. 15:25-20:59. Claims 1, 12, 13, 25, and 33 are independent claims, and the remaining claims are dependent on one of those

claims. Id. The '677 patent consists of claims 1 through 24. '677 patent, cols. 15:21-18:9. Claims 1 and 16 are independent claims, and the remaining claims are dependent on one of those claims. Id. Prior to the hearing, the parties submitted a Joint Claim Construction Statement [Docket No. 44]. The parties dispute the meaning of the following claim terms:

- "scanning head," found in claims 1 and 3 of the '486 patent and claims 1, 3, 4, 7, 8, 9, 11, 12, 13, and 14 in the '677 patent;
- "arranged for operative engagement," found in claim 1 of the '486 patent and claim 7 of the '677 patent;
- "force sensor," found in claims 1 and 3 of the '486 patent and claims 1, 7 and 8 in the '677 patent;
- "capable of deflection," found in claim 1 of the '486 patent and claim 7 of the '677 patent;
- "said pick-up plate positioned between said separate drive plates and separated from each drive plate by an insulating spacer," found in claim 1 of the '486 patent;
- "a conductive central plate suspended by spring means between said drive plates," found in claim 1 of the '486 patent;
- "means for transmitting force from a point remote from said central plate and said central portion," found in claim 1 of the '486 patent;
- "means for measuring the output signal of said force sensor and utilizing said output signal to control a vertical movement of said scanning head to maintain a constant force on a sample as said surface topography is measured," found in claim 1 of the '486 patent;
- "operably arranged," found in claim 1 of the '677 patent;
- "moveably mounted," found in claim 1 of the '677 patent;
- "means for transmitting force between an object remote from the pick-up plate

and the pick-up plate," found in claims 1, 2, and 7[3] of the '677 patent;

- "means responsive to the position of the pick-up plate relative to the drive plate for providing an output signal proportional to the relative position," found in claim 1 of the '677 patent;

- "means for utilizing said output signal to control a vertical movement of the scanning head relative to the sample," found in claim 3 of the '677 patent;

- "moveably suspended," found in claim 7 of the '677 patent;

- "means for measuring the output signal of said force sensor and utilizing the output signal to control a vertical movement of the scanning head," found in claim 8 of the '677 patent;

- "means responsive to the output signal for controlling the movement of the scanning head," found in claim 11 of the '677 patent;

- "wherein the means responsive to the output signal further controls the movement of the scanning head in a two-dimensional horizontal direction," found in claim 13 of the '677 patent;

- "wherein the means for controlling movement of the scanning head provides an output signal to an image display, wherein the image display provides an image representative of the surface property being measured," found in claim 14 of the '677 patent; and

- "means responsive to the output signal for providing an image representative of the surface topography," found in claim 15 of the '677 patent.

III. DISCUSSION

A. Standard of Review

Claim construction is a matter of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed. Cir. 1995), aff'd, 517 U.S. 370 (1996). In construing claims, courts should look first to intrinsic evidence, which includes the claims, the specification, and the prosecution

[3] The actual language in claim 7 is slightly different, ". . . the pick-up plate *to* the pick-up plate" (emphasis added).

history. Vitrionics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996). Claim words are given their ordinary and customary meaning, which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." Phillips v. AWH Corp., 415 F.3d 1303, 1312-13 (Fed. Cir. 2005). However, a patentee can choose to be "his or her own lexicographer by clearly setting forth an explicit definition for a claim term." Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d 985, 989 (Fed. Cir. 1999). Claim terms "should be construed consistently with [their] appearance in other places in the same claim or other claims of the same patent." Rexnord Corp. v. The Laitram Corp., 274 F.3d 1336, 1342 (Fed. Cir. 2001). In addition, the specification is usually "dispositive; it is the single best guide to the meaning of a disputed term." Vitrionics, 90 F.3d at 1582. Courts are nonetheless cautioned not to import limitations from the specification into the claims. Phillips, 415 F.3d at 1323; The Laitram Corp. v. NEC Corp., 163 F.3d 1342, 1347 (Fed. Cir. 1998).

While courts can consider extrinsic evidence to educate themselves about the patent and technology at issue, it is improper to rely on extrinsic evidence in construing claims unless, after consideration of all the intrinsic evidence, ambiguity remains. Mantech Envtl. Corp. v. Hudson Envtl. Servs., Inc., 152 F.3d 1368, 1373 (Fed. Cir. 1998); Vitrionics, 90 F.3d at 1584. Extrinsic evidence is "evidence which is external to the patent and file history, such as expert testimony, inventor testimony, dictionaries, and technical treatises and articles." Vitrionics, 90 F.3d at 1584. Dictionaries may be useful to courts in understanding the ordinary and customary meaning of words, and courts may "rely on dictionary definitions when construing claim terms, so long as the dictionary definition does not contradict any definition found in or ascertained by

a reading of the patent documents." Phillips, 415 F.3d at 1322-23.

B. "Scanning Head"

"Scanning head" is found in claims 1 and 3 of the '486 patent and claims 1, 3, 4, 7, 8, 9, 11, 12, 13, and 14 in the '677 patent. Hysitron asserts that "scanning head" means "an assembly configured to cause the probe and sample to move relative to one another in three dimensions, including a back-and-forth scan in two dimensions." Joint Claim Construction Statement at 1. Hysitron's claim construction incorporates all actuator configurations known at the time of the invention. Hysitron's Markman Brief [Docket No. 145] at 28. MTS asserts that "scanning head" means "an actuator with a probe mounted thereon which moves in the x, y, and z directions to engage the surface of a sample during scanning, or a sample holder which incorporates an actuator which moves the sample in the x, y, and z directions during scanning." Joint Claim Construction Statement at 7. MTS's claim construction requires a scanning head to be a unitary device able to scan in the x, y, and z directions. MTS's Markman Brief [Docket No. 148] at 14.

MTS argues that the claims and specification make clear that "scanning head" is a single unit because the claim language consistently refers to "scanning head" in the singular. In the disputed claims, "scanning head" is preceded by the singular articles "a" and "the." '486 patent, col. 15:27; '677 patent, cols. 15:23, 15:41, 15:44, 15:56, 16:5, 16:8, 16:19, 16:21, 16:23, 16:26. "A" and "the" also precede "scanning head" throughout the specification. See '486 patent, cols. 12:23-28, 14:42-50. Additionally, MTS emphasizes that the "patentee's remarks about the heart of the invention underscore this reading: 'the key to operation of patentee's invention is that a scanned probe microscope apparatus incorporates a probe in a scanning head arranged for

operative engagement of a surface of a sample or measuring a surface topography thereof.'" MTS's Markman Br. at 17 (quoting '486 patent, col. 14:47-51). MTS contends that these references demonstrate unambiguously that a "scanning head" is a unitary device.

The Court disagrees that the use of "a" and "the" remove ambiguity from the definition. If, as Hysitron contends, a "scanning head" is an assembly of parts the assembly is a collective noun making appropriate the use of the singular article. Additionally, the language MTS cites from the specification implies multiple parts to a scanning head. If an SPM "incorporates a probe in a scanning head arranged for operative engagement," it necessarily requires multiple parts to be "arranged." While the arrangement could exist between a probe and a unitary scanning head, the arrangement also could exist between a probe and multiple elements of a scanning head. For these reasons, the patentee's use of "a" and "the" is not dispositive of the issue.

MTS also argues that none of the figures in the specification show or suggest that a "scanning head" could be composed of multiple components. Because each of the figures contains a box, or single device, labeled "scanning head," MTS asserts a "scanning head"is a unitary device. This interpretation ignores the limiting language in the specification that: "[a] scanning head (a piezo actuated head in the *illustrated embodiment*). . . ." '486 patent, col. 12:24-25 (emphasis added). This qualifying language clearly implies that the patent anticipates other types of scanning heads and that the figures in the specification were not intended to represent the only type of scanning head that could be employed. Moreover, a patentee "is not required to describe in the specification every conceivable and possible future embodiment of his invention." Rexnord Corp., 274 F.3d at 1344. The figures in the specification do not limit the

term "scanning head" in the patent to a unitary device.

Hysitron argues that the independent claims that define "scanning head" are in Jepson form. Jepson form is used when a claim covers an improvement to the known art and requires:

> (1) A preamble comprising a general description of all the elements or steps of the claimed combination which are conventional or known,
> (2) a phrase such as "wherein the improvement comprises," and
> (3) those elements, steps and/or relationships which constitute that portion of the claimed combination which the applicant considers as the new or improved portion.

37 C.F.R. § 1.75(e); see also Dow Chem. Co. v. Sumitomo Chem. Co., 257 F.3d 1364, 1368 (Fed. Cir. 2001). The parties agree that the claims are in Jepson form, but disagree whether elements recited in the preamble encompass all known embodiments of prior art or merely well-known embodiments.

In support of its argument that elements recited in the preamble encompass all known embodiments of the prior art, Hysitron cites Zoran Corp. v. Mediatek, Inc., No. 04-04609, 2005 U.S. Dist. LEXIS 34454, at *32-35 (N.D. Cal. Sept. 9, 2005). Zoran involved patents dealing with an improved CD-ROM drive. Id. at *4. The defendants advanced a claim construction based on the contention that only one type of circuitry was known in the art. Id. at *32. The court rejected the argument for multiple reasons but central to its analysis was the plaintiffs' presentation of evidence that other types of circuitry were known by one skilled in the art at the time of the patent's filing. Id. at *33. While not binding on this Court, Zoran is persuasive support for Hysitron's construction.

MTS counters that Jepson format limits the scope of an invention to "well known" embodiments of the prior art and, in support, cites Dow Chemical. There, the court stated that

"the claimed process is written in Jepson format, and describes certain conditions as an improvement over a well known process." 257 F.3d at 1181. MTS's position is that limiting the scope to well known embodiments is the logical corollary to the requirement that claims be construed according to their "ordinary and accustomed meaning as understood by one of ordinary skill in the art." See id. at 1373. MTS submits the testimony of an expert, Dr. Dawn Bonnell who opines that the standard and well known configuration of a scanning head at the time of the patent application consisted of a unitary device. Pearson Aff. [Docket No. 150], Ex. 7 (Bonnell Decl.) ¶ 11. Dr. Bonnell also admits that at the time of the patent application devices existed that had separate x-y and z controls but states that they were not commonly used. Id. ¶¶ 24, 25. One such device is disclosed in the declaration of Hysitron's expert, Dr. Richard J. Colton. Graham Decl. Ex. 3 (Colton Decl.) ¶ 21 (citing D. Sarid, D. Iams, V. Weissenberger & L.S. Bell, "Compact scanning-force microscope using laser diode," Optical Letters 13(12) at 1057-59 (1988).

The Court finds that when the Jepson form is used, the scope of an invention includes all known embodiments of the art. Thirty-seven C.F.R. § 1.75(e)(1) requires that an independent claim contain a preamble that sets forth a general description of "all the elements or steps of the claimed combination which are conventional or known." The regulation establishes clear that prior art is not confined only to those elements that are "conventional" or well-known but rather extends to "all" elements. This interpretation best effectuates the purpose of the Jepson form, which is to provide a clear and consistent vehicle for an improvement on prior art. For this

reason, the Jepson form of the patents supports Hysitron's definition of "scanning head."[4]

Finally, the prosecution history supports Hysitron's claim construction. The Patent and Trademark Office ("PTO") rejected the initial application, serial number 327,979 (the '979 application"), for this patent. The Examiner initially found uncertainty as to whether the "3-D piezo actuator" in the '979 application was the same device as the "scanning head." Graham Decl., Ex. 11 ('979 application) at 15. The patentee changed the specification to the current form to address that "other types of scanning heads are contemplated while still remaining within the scope of the present invention." Id. This amendment clearly indicates the patentee intended that multiple types of scanning heads be included within the scope of the patent. Therefore, based on the intrinsic evidence and the prosecution history, the Court construes "scanning head" to mean "an assembly configured to cause the probe and sample to move relative to one another in three dimensions, including a back-and-forth scan in two dimensions."

C. "Force Sensor"

The second term to construe, "force sensor," is found in claims 1 and 3 of the '486 patent and claims 1, 7 and 8 of the '677 patent. Hysitron asserts that "force sensor" means "a device that indicates force by assessing force, weight, or position." Joint Claim Construction Statement at 16. MTS asserts that "force sensor" means a "stacked configuration of five substrates sandwiched together calibrated to measure force; the third substrate of the five includes a planar

[4] Even under the "well-known" standard suggested by MTS, Hysitron's interpretation could hold force. There has been little analysis of what constitutes "well-known" among people of ordinary skill in the art. Dr. Bonnell's opinion that the existence of a few "one-off" devices that used a multiple actuator scanning head did not rise to the level of well-known is merely that—one opinion. And that opinion is contradicted by the opinion of Dr. Colton. When, exactly, scientific knowledge and use has adequately entered the Zeitgeist of the scientific community to rise to the level of "well-known" is not a question this Court can answer.

or flat control plate suspended between spring-like members which are imbedded in and integral to this substrate and which measures the force between the probe tip and the sample." Id. at 20.

Hysitron's construction is remarkably broad. It also ignores express limitations contained in the claim. Independent claim 1 states:

> the improvement comprising: . . . a force sensor . . . wherein said force sensor includes,
> i. a pair of capacitive transducers, each transducer including a separate drive plate, the first said drive plates having a hole centrally disposed therethrough, and a shared pick-up plate, said pick-up plate positioned between said drive plates and separated from each drive plate by an insulating spacer, said drive plates having spaced opposing conductive surfaces when said pick-up plate is mounted therebetween, said pick-up plate further including a conductive central plate suspended by spring means between said drive plates, wherein said central plate is capable of deflection between the conductive surfaces of said drive plates. . . .

'486 patent, col. 15:36-47. "Force sensor," as defined in these patents, is more complex than Hysitron's construction implies. Tellingly, Hysitron admits in its Markman Brief that the claims are more specific than its proposed construction requiring "a force sensor that includes a pair of capacitive transducers and that each have a separate drive plate and shared moveable pick-up plate." Hysitron's Markman Br. at 35. However, the limitations in the claim are not entirely clear, requiring the Court to consider the specification and prosecution history to determine the proper construction of this term.

Most of the specification describes the preferred embodiment of the force sensor. See, e.g., '486 patent, col. 4:6-31. However, the specification does describe the present invention more broadly in a number of places. For example, the patent teaches that the "sensor element *of the present invention* comprises first and second, serially connected variable capacitors . . . . More specifically, the sensor comprises a stacked configuration of five substrates." Id., 5:16-20

(emphasis added). A portion of the inner side of the first and fifth substrates "each comprise the first (drive plates) of a different variable capacitor." Id., col. 5:22-25. The second and fourth substrates abut the first and fifth substrates respectively and "comprise insulating substrates or frame members having an open central portion at least as large as a central plate of the third substrate." Id., col. 5:37-40. Finally, the third substrate is "sandwiched" between the second and fourth substrates and "includes a planar central plate which is suspended by spring-like members. In the preferred embodiments, the spring-like members include four relatively thin L-shaped springs." Id., col. 5:42-49. When the written description refers to "this invention" or "the present invention," a court may conclude that the following description covers the claim—not just the preferred embodiment. See Honeywell Int'l, Inc. v. ITT Indus., Inc., 452 F.3d 1312, 1318 (Fed. Cir. 2006). Additionally, the majority of this description of a force sensor does not describe a particular embodiment because the language "[i]n the preferred embodiments," is directed specifically to the "four relatively thin L-shaped springs."

The prosecution history confirms that the construction of "force sensor" is more specific than Hysitron suggests. Under the '979 application, the PTO rejected claims 1-40 for various reasons. In explaining the rejection, the examiner stated that "[p]rior art was not relied upon to reject claims 1-40 because the prior art fails to teach and/or make obvious a force sensor having the claimed structure/details in combination with a probe and means for translating output signals from the force sensor into surface topography readings/images." Pearson Aff., Ex. 14 at 5. Thus, the PTO believed that the force sensor contained some level of "structure/detail" that is more specific than "a device that indicates force by assessing force, weight, or position." The language in claim 1 expresses that "structure/detail." Hysitron's proffered construction is

rejected as overly broad.

MTS's construction, however, also is not appropriate as it is too narrow. Adhering more closely to the specification and prosecution history, the court construes "force sensor" to mean "a stacked configuration of five substrates consisting of a pair of drive plates found in the first and fifth substrate, a pair of insulating substrates found in the second and fourth substrate, and a third substrate sandwiched between the second and fourth substrate that includes a planar central plate which is suspended by spring-like members operatively located to measure the force between the sample and the probe tip."

D. "Arranged for Operative Engagement" and "Operably Arranged"

"Arranged for operative engagement" is found in claim 1 of the '486 patent and claim 7 of the '677 patent and "operably arranged" is found in claim 1 of the '677 patent. Hysitron asserts that both of these terms are easily understood and do not require clarification by the Court. Joint Claim Construction Statement at 11, 47. MTS asserts the same construction for both terms: "where the sample is moved in the x, y, and z directions when in contact with a probe, or a probe is moved in the x, y, and z directions when in contact with a sample, and where said movement of the sample or said movement of the probe in the z direction is controlled by feedback from a force sensor." Id. at 11-12, 48.

MTS's construction of these terms follows from its proposed unitary construction of "scanning head." Adopting that construction would eliminate the possibility that components of the scanning head be "operably arranged" or "arranged for operative engagement." The Court has rejected MTS's construction of "scanning head" and accordingly rejects MTS's construction of "operably arranged" and "arranged for operative engagement." Webster's New Collegiate

Dictionary (1977) defines "operative" as "producing an appropriate effect." Supra at 804. It defines "arrange" as "to put into a proper order or into a correct or suitable sequence, relationship, or adjustment." Id. at 62. It defines "engage" as "to interlock with." Id. at 378. Therefore, the Court defines "operably arranged" to mean "placed in a suitable relationship so as to produce the appropriate effect" and "arranged for operative engagement" to mean "placed in a suitable relationship so as to interlock appropriately."

E. "Capable of Deflection"

"Capable of deflection" is found in claim 1 of the '486 patent and claim 7 of the '677 patent. Hysitron asserts that "capable of deflection" means the "central plate is capable of deviation from a starting position between the conductive surfaces of the drive plates." Joint Claim Construction Statement at 23-24. MTS asserts that "capable of deflection means "capable of being bent or deformed."

The intrinsic evidence supports Hysitron's construction. The specification teaches that "the central plate under force, moves closer or further away from one or the other of the outer most substrate." '486 patent, col. 10:12-14. The specification also states that the metal mass of the central plate is "displaceable within the frame opening when the five substrates are sandwiched together." Id., col. 5:49-51. The value in the invention is the ability of the central plate to deflect or displace relative to the drive plates. MTS argues that the L-shaped springs "act as 'hinges' which bend or flex to allow the central plate to deflect within the openings formed by the insulating substrates while maintaining the outer portion of the central plate generally parallel to the drive plates." MTS's Markman Br. at 49. This construction relies on the distinct L-shape springs that are mentioned only in the preferred embodiment. See '486

patent, col. 5:47-49. Because the patent is not confined to the preferred embodiment, MTS's argument is unpersuasive. The Court construes "capable of deflection" to mean "the central plate is capable of deviation from a starting position between the conductive surfaces of the drive plates."

F. "Said Pick-Up Plate Positioned Between Said Separate Drive Plates and Separated from Each Drive Plate by an Insulating Spacer"

The next term to construe is "said pick-up plate positioned between said separate drive plates and separated from each drive plate by an insulating spacer" found in claim 1 of the '486 patent. Hysitron construes the term as "the pick-up plate is positioned between the drive plates and separated from the drive plates by an electronically non-conductive structure." Joint Claim Construction Statement at 33. MTS asserts the term means "separated by two insulating spacers which are insulating frame members comprising the second and fourth substrates of a stacked configuration of five substrates or plates." Id. at 35. When construing claims, "the language of the claim defines the scope of the protected invention." Bell Commc'ns Research, Inc. v. Vitalink Commc'ns Corp., 55 F.3d 615, 619 (Fed. Cir. 1995). The Court has adopted a construction of "force sensor" in Claim 1 that includes "a pair of insulating substrates found in the second and fourth substrate." Hysitron's construction would broaden the patent beyond the limitations written into the patent by the patentee.

The Court adopts MTS's construction that "said pick-up plate positioned between said separate drive plates and separated from each drive plate by an insulating spacer" means "separated by two insulating spacers which are insulating frame members comprising the second and fourth substrates of a stacked configuration of five substrates or plates."

G. "A Conductive Central Plate Suspended by Spring Means Between Said Drive

Plates"

"A conductive central plate suspended by spring means between said drive plates" appears in claim 1 of the '486 patent. Hysitron asserts the term means "the conductive central plate is suspended between the drive plates by spring means." Joint Claim Construction Statement at 37. MTS asserts it means "directly attached to springs or some other compliant suspension element allowing movement or relative motion." Id. at 38.

Key to MTS's construction is that the central plate be "directly attached to springs or some other compliant suspension element" and that the central plate be "between the drive plates." MTS's Markman Br. at 46. The language from the specification cited by MTS does not support its construction. Each of the cited references contains qualifying language: (1) "The pick-up plate *can be generally* . . ."; (2) *In the preferred embodiments,* the spring-like members include . . ."; (3) "The third on central substrate layer *can be* an etched metal layer . . ."; and (4) "Although a pattern of four L-shaped slits are depicted in the figure, it is believed that *other patterns may be utilized* . . . ." Id. at 47 (quoting '486 patent, cols. 4:28-29, 5:46-49, 9:22-29, 9:32-35) (emphasis added). The plain language of the patent anticipates configurations in which the spring means is not directly attached to the central plate. Therefore, the Court construes "a conductive central plate suspended by spring means between said drive plates" to mean "the conductive central plate is suspended between the drive plates by spring means."

H. "Movably Mounted" and "Movably Suspended"

The next terms to construe are "moveably mounted" found in claim 1 of the '677 patent and "moveably suspended" found in claim 7 of the '677 patent. Hysitron asserts that these terms are common and easily understandable and do not require clarification. Joint Claim

Construction Statement at 48, 58. To the extent the terms require a definition, Hysitron offers "the pick-up plate be mounted in a manner that enables it to move relative to the drive plate." Id. MTS asserts the terms mean "directly attached to springs or to some other compliant suspension element allowing movement or relative motion." Id. at 49, 58. The dispute over these terms echoes the dispute discussed in the previous section, and MTS's construction fails for the same reason. The Court construes "moveably mounted" and "moveably suspended" to mean that "the pick-up plate be mounted in a manner that enables it to move relative to the drive plate."

I. Means-Plus-Function Claims

The remaining disputed claim elements are subject to a means-plus-function analysis. Means-plus-function claim elements are interpreted according to 35 U.S.C. § 112, ¶ 6:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

"Whether certain claim language invokes 35 U.S.C. § 112, ¶ 6 is an exercise in claim construction and . . . a question of law." Personalized Media Commc'ns, LLC v. Int'l Trade Comm'n, 161 F.3d 696, 702 (Fed. Cir. 1998).

> Use of the term "means" in a claim limitation creates a presumption that section 112, paragraph 6 has been invoked, but that presumption may be rebutted if the properly construed claim limitation itself recites sufficiently definite structure to perform the claimed function. Conversely, absence of the word 'means' creates a presumption that section 112, paragraph 6 has not been invoked, and that presumption may likewise be rebutted if the claim limitation is determined not to recite sufficiently definite structure to perform the claimed function. After a court establishes that a means-plus-function limitation is at issue, it must then construe the function recited in that claim and determine what structures have been disclosed in the specification that correspond to the means for performing that function.

Kemco Sales, Inc. v. Control Papers Co., Inc., 208 F.3d 1352, 1361 (Fed. Cir. 2000). In determining whether a term in a claim limitation recites sufficient structure, the court inquires into whether the "term, as a name for structure, has a reasonably well understood meaning in the art." Watts v. XL Sys., Inc., 232 F.3d 877, 880-81 (Fed. Cir. 2000). "Because the claims of a patent are afforded the statutory presumption of validity, overcoming the presumption of validity requires that any facts supporting a holding on invalidity must be proved by clear and convincing evidence." Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1376 (Fed. Cir. 2001).

1. "Means for Transmitting Force from a Point Remote from Said Central Plate and Said Central Portion" and "Means for Transmitting Force between an Object Remote from the Pick-Up Plate and the Pick-Up Plate"

The term "means for transmitting force from a point remote from said central plate and said central portion" is found in claim 1 of the '486 patent and the term "means for transmitting force between an object remote from the pick-up plate and the pick-up plate" is found in claims 1, 2, and 7[5] of the '677 patent. Hysitron asserts that these elements correspond to "a stem, pedestal, pedestal having a stem portion, sample holder, or rod or member passed through the hole in one drive plate and abutting, contacting, attaching to the central plate, and equivalents thereof." Joint Claim Construction Statement at 39, 50, 58-59. MTS asserts these elements correspond to "a sample holder attached to the pick-up plate so that it moves in unison with such plate, or any rod or member passed through the hole in one drive plate and in contact with the central plate, that may transmit force to the pick-up plate." Id. at 43, 52, 59.

The specification teaches that the means for transmitting force "can include a sample

[5] Again, the precise language in claim 7 is slightly different reading ". . . the pick-up plate *to* the pick-up plate" (emphasis added).

holder which is attached to the pick-up plate so that it moves in unison with such plate. Alternatively, any rod or member passed through the hole in one drive plate and in contact with the central plate may transmit force to the pick-up plate." '486 patent, col. 4:34-38. The specification further states that the means for transmitting force to the central plate includes a "sample holder or pedestal, [which] passes through the first and second substrate without contact, while abutting, contacting or attaching to the suspended metal mass proximate its center." Id., col. 5:54-57. Hysitron's expert, Dr. Colton, identified numerous structures in both the '486 and '677 patents that correspond to these terms including a "stem, pedestal, pedestal having a stem portion, sample holder, or rod or member passed through the hole in one drive plate and abutting, contacting, attaching to the central plate." Colton Aff. ¶¶ 47, 49, 54. MTS did not include in its Markman brief any discussion of the proper construction of these claims.

The Court finds that "means for transmitting force from a point remote from said central plate and said central portion" and "means for transmitting force between an object remote from the pick-up plate and the pick-up plate" correspond to "a stem, pedestal, pedestal having a stem portion, sample holder, or rod or member passed through the hole in one drive plate and abutting, contacting, attaching to the central plate."

2. "Means for Measuring the Output Signal of Said Force Sensor and Utilizing Said Output Signal to Control a Vertical Movement of Said Scanning Head to Maintain a Constant Force on a Sample as Said Surface Topography is Measured"; "Means for Utilizing Said Output Signal to Control a Vertical Movement of the Scanning Head Relative to the Sample"; "Means for Measuring the Output Signal of Said Force Sensor and Utilizing the Output Signal to Control a Vertical Movement of the Scanning Head"; "Means Responsive to the Output Signal for Controlling the Movement of the Scanning Head"; "Wherein the Means Responsive to the Output Signal Further Controls the Movement of the Scanning Head in a Two-Dimensional Horizontal Direction"; and "Wherein the Means for Controlling Movement of the Scanning Head Provides an Output Signal to an Image Display,

Wherein the Image Display Provides an Image Representative of the Surface Property Being Measured"

The next terms to construe are identified in the heading and are found, respectively, in claim 1 of the '486 patent and in claims 3, 8, 11, 13, and 14 of the '677 patent**,** Hysitron asserts these elements correspond to "an STM-type controller and equivalents thereof." Joint Claim Construction Statement at 44, 55, 59, 62, 64, 65. MTS asserts that "no corresponding structure is disclosed for [these] means-plus-function claim limitation[s]." MTS's Markman Br. at 49.

MTS argues that the patentee merely "disclosed a 'black box' and hence the disclosed structure is insufficient and the associated claims are invalid." Id. at 50. It relies on the Federal Circuit's decision in Biomedino, LLC v. Waters Technologies Corp., to support this argument. In Biomedino, the language to be construed was "'automatically operating said valving'/'automatically operating valves.'" 490 F.3d 946, 950 (Fed. Cir. 2007). The parties agreed that the only references in the specification to the "control means" were "the box labeled 'Control' in Figure 6 and a statement that the regeneration process may be 'controlled automatically by known differential pressure, valving and control equipment.'" Id. The court found that the patent was invalid for indefiniteness because "a bare statement that known techniques or methods can be used does not disclose structure." Id. at 953. "The inquiry is whether one of skill in the art would understand the specification itself to disclose a structure, not simply whether that person would be capable of implementing that structure." Id.

The Court finds this case distinguishable from Biomedino. Unlike in Biomedino, the specifications of both patents make several references to an STM-type controller. The patent teaches that with "a scanning tunneling microscope, a sample is placed on a sample platform for analysis. The scanning tunneling microscope senses atomic scale topography by means of

electrons that tunnel across the gap between a probe and the surface of a sample." '486 patent, col. 12:20-24; '677 patent, col. 12:11-15. The patent then discusses how the scanning head with the probe operates. The patent states that the "voltage applied to the scanning head is controlled by the scanning tunneling microscope controller." '486 patent, col.12:32-34; '677 patent, col. 12:23-25. Later in the patent, it teaches that the "force sensor output signal may then be utilized to control the vertical position of the probe or position along the Z axis by sending such a signal through the scanning tunneling microscope controller during surface imaging." '486 patent, cols. 12:65-13:2; '677 patent, col. 12:60-63. Additionally, Hysitron has presented Dr. Colton's opinion that the structure described in the specifications corresponds to the means for measuring and utilizing the output of the force sensor. Colton Aff. ¶¶ 48, 53, 55, 56, 57. MTS's expert offered no opinion on whether there was a structure described in the specification, Graham Aff., Ex. 4 (Bonnell depo.) at 122-23, and MTS has presented no other evidence to overcome the presumption of validity. See Budde, 250 F.3d at 1376.

For these reasons, the Court construes "means for measuring the output signal of said force sensor and utilizing said output signal to control a vertical movement of said scanning head to maintain a constant force on a sample as said surface topography is measured," "means for utilizing said output signal to control a vertical movement of the scanning head relative to the sample," "means for measuring the output signal of said force sensor and utilizing the output signal to control a vertical movement of the scanning head," "means responsive to the output signal for controlling the movement of the scanning head," "wherein the means responsive to the output signal further controls the movement of the scanning head in a two-dimensional horizontal direction," and "wherein the means for controlling movement of the scanning head

provides an output signal to an image display, wherein the image display provides an image representative of the surface property being measured" to correspond to "an STM-type controller and equivalents thereof."

3. "Means Responsive to the Position of the Pick-Up Plate Relative to the Drive Plate for Providing an Output Signal Proportional to the Relative Position"

The Court next construes "means responsive to the position of the pick-up plate relative to the drive plate for providing an output signal proportional to the relative position" found in claim 1 of the '677 patent. Hysitron asserts this element corresponds to a "second drive plate to form a three-plate capacitive structure, and equivalents thereof." Joint Claim Construction Statement at 53. MTS asserts that no corresponding structure has been disclosed.

MTS did not address this issue in its Markman Brief. Hysitron directs the Court to two sources to support its contention. Dr. Colton states that he agrees with Hysitron's contention that "the term means 'a second drive plate to form a three-plate capacitive structure, and equivalents thereof." Colton Aff. ¶ 50. He states that a benefit of the three-plate capacitive sensor is to provide "an output that is linear, or proportional, to the position of the central plate. The '677 patent clearly recognizes that the third plate makes the output signal proportional to the position of the moving plate." Id. ¶ 51. He then cites specific language in the specification that describes the function of the three-plate capacitive sensor. Id.; see '677 patent, col. 5:21-34. Dr. Colton also identifies another structure corresponding to the means. Colton Aff. ¶ 52. The patent teaches that means "are also provided for reading the output from the sensor element, and converting the output to a signal proportional to force, weight, or displacement of the central amplifier of very high input impedance . . . and then synchronously demodulated to produce a DC signal." '677 patent, col. 10:20-25. MTS has presented no evidence to overcome the

presumption of validity, see Budde, 250 F.3d at 1376, and based on the specification and the evidence presented by Hysitron, the Court construes "means responsive to the position of the pick-up plate relative to the drive plate for providing an output signal proportional to the relative position" to correspond to "a second drive plate to form a three-plate capacitive structure, and equivalents thereof."

4. "Means Responsive to the Output Signal for Providing an Image Representative of the Surface Topography"

The final term is "means responsive to the output signal for providing an image representative of the surface topography" found in claim 15 of the '677 patent. Hysitron asserts that this element corresponds to the structure "an STM-type controller and an image display." Joint Claim Construction Statement at 67. MTS asserts there is no structure corresponding to this element. Id. at 68.

Again, MTS did not specifically address this issue in its Markman Brief. Hysitron cites two passages in the specification to support its position. The first teaches that the "controller adjusts the output to the scanning head which responds by moving the tip of the probe up and down, following the surface relief. The probe's movements are translated into an image of the surface and displayed on an image display." '677 patent, col. 12:36-40. The second passage teaches that "a constant height image could be obtained where the probe tip Z-position or vertical height is held constant, and the image is obtained directly from the force sensor output signal from the force controller, which again passes through the scanning tunneling microscope controller and results in a display of surface topography on the image display." Id., col. 13:23-30. Hysitron also offers Dr. Colton's affidavit in which he states that he agrees with Hysitron's interpretation. Colton Aff. ¶ 58. MTS has presented no evidence to overcome the presumption

of validity, see Budde, 250 F.3d at 1376, and based on the specification and the evidence presented by Hysitron, the Court construes "means responsive to the output signal for providing an image representative of the surface topography" found in claim 15 of the '677 patent to correspond to "an STM-type controller and an image display."

IV. CONCLUSION

Based upon the foregoing, and all of the files, records and proceedings herein, **IT IS HEREBY ORDERED** that in interpreting the '486 and '677 patents, the contested terms be construed with this Order:

1. In claims 1 and 3 of the '486 patent and claims 1, 3, 4, 7, 8, 9, 11, 12, 13, and 14 in the '677 patent, the term "scanning head" is construed to mean "an assembly configured to cause the probe and sample to move relative to one another in three dimensions, including a back-and-forth scan in two dimensions;"

2. In claims 1 and 3 of the '486 patent and claims 1, 7 and 8 in the '677 patent, the term "force sensor" is construed to mean "a stacked configuration of five substrates consisting of a pair of drive plates found in the first and fifth substrate, a pair of insulating substrates found in the second and fourth substrate, and a third substrate sandwiched between the second and fourth substrate that includes a planar central plate which is suspended by spring-like members operatively located to measure the force between the sample and the probe tip;"

3. In claim 1 of the '486 patent and claim 7 of the '677 patent, the term "arranged for operative engagement" is construed to mean "placed in a suitable relationship so as to interlock appropriately;"

4. In claim 1 of the '677 patent, the term "operably arranged" is construed to mean

"placed in a suitable relationship so as to produce the appropriate effect;"

5. In claim 1 of the '486 patent and claim 7 of the '677 patent, the term "capable of deflection" is construed to mean "the central plate is capable of deviation from a starting position between the conductive surfaces of the drive plates;"

6. In claim 1 of the '486 patent, the term "said pick-up plate positioned between said separate drive plates and separated from each drive plate by an insulating spacer" is construed to mean "separated by two insulating spacers which are insulating frame members comprising the second and fourth substrates of a stacked configuration of five substrates or plates;"

7. In claim 1 of the '486 patent, the term "a conductive central plate suspended by spring means between said drive plates" is construed to mean "the conductive central plate is suspended between the drive plates by spring means;"

8. In claim 1 of the '677 patent and in claim 7 of the '677 patent, the terms "moveably mounted" and "moveably suspended" are construed to mean that "the pick-up plate be mounted in a manner that enables it to move relative to the drive plate;"

9. In claim 1 of the '486 patent, the term "means for transmitting force from a point remote from said central plate and said central portion" and in claims 1, 2, and 7[6] of the '677 patent, the term "means for transmitting force between an object remote from the pick-up plate and the pick-up plate" correspond to "a stem, pedestal, pedestal having a stem portion, sample holder, or rod or member passed through the hole in one drive plate and abutting, contacting, attaching to the central plate;"

[6] The actual language in claim 7 is slightly different, ". . . the pick-up plate *to* the pick-up plate."

10. In claim 1 of the ‘486 patent, the term “means for measuring the output signal of said force sensor and utilizing said output signal to control a vertical movement of said scanning head to maintain a constant force on a sample as said surface topography is measured,” in claim 3 of the ‘677 patent, the term “means for utilizing said output signal to control a vertical movement of the scanning head relative to the sample,” in claim 8 of the ‘677 patent, the term “means for measuring the output signal of said force sensor and utilizing the output signal to control a vertical movement of the scanning head,” in claim 11 of the ‘677 patent, the term “means responsive to the output signal for controlling the movement of the scanning head,” in claim 13 of the ‘677 patent, the term “wherein the means responsive to the output signal further controls the movement of the scanning head in a two-dimensional horizontal direction,” and in claim 14 of the ‘677 patent, the term “wherein the means for controlling movement of the scanning head provides an output signal to an image display, wherein the image display provides an image representative of the surface property being measured” correspond to “an STM-type controller and equivalents thereof;”

11. In claim 1 of the ‘677 patent, the term “means responsive to the position of the pick-up plate relative to the drive plate for providing an output signal proportional to the relative position” corresponds to “a second drive plate to form a three-plate capacitive structure, and equivalents thereof;” and

12. In claim 15 of the '677 patent, the term "means responsive to the output signal for providing an image representative of the surface topography" corresponds to "an STM-type controller and an image display."

BY THE COURT:

s/Ann D. Montgomery
ANN D. MONTGOMERY
U.S. DISTRICT JUDGE

Dated: April 28, 2009.